

# JDRF says...

1. JDRF says “When scientists use somatic cell nuclear transfer (SCNT), no sperm is used and the resulting cell has not chance of developing into a human being.....” If this statement is true, then why do they attempt to ban it from being implanted into a uterus?
2. JDRF complains that the NIH-approved lines are contaminated with mouse “feeder” cells. However, all of the 17 new Harvard lines they want federal research dollars for were also grown on mouse feeder cells, and 16 NIH-approved embryonic stem cell lines have never been developed, and so have never been in contact with mouse feeder cells.
3. JDRF cites as proof of concept of embryo stem cell research: “Human embryonic stem cells allow paralyzed rats to walk.” Yet, this research is only being published this month even though it was first reported in 2002. The Wall Street Journal reports that many scientists doubt that this treatment will be effective in humans. In fact, much of the research on EScells that is announced with great significant media attention has later been quietly retracted:

2001 - the media heralded study showed EScells turned into pancreatic cells that only produced 1/50th the normal amount of insulin. Lumelsky N. et al., "Differentiation of embryonic stem cells to insulin-secreting structures similar to pancreatic islets," *Science* 292, 1389-1394; May 18, 2001.

In January 2003, a follow-up study showed that these pancreatic cells did not actually produce insulin (absorbed it from the culture).

A 2002 study showed EScells turned into a kind of insulin-producing cell, not beta cells, that produced 13% of the normal insulin levels. When injected, the mice were kept alive but not enough to cure the diabetes.

In 2004, a study showed that EScells produced insulin-producing cells, again not beta cells, and they did not cure the mice but formed tumors.

5. JDRF claims EScells are essential for curing diabetes. They make no mention that they are genetically unstable, difficult to control in the Petri dish, and susceptible to tumor formation.

“[T]he possibility arises that transplantation of differentiated human ES cell derivatives into human recipients may result in the formation of ES cell-derived tumors.”

Odorico JS, Kaufman DS, **Thomson JA**, “Multilineage differentiation from human embryonic stem cell lines,” *Stem Cells* 19, 193-204; 2001

Normally, if you take an embryonic stem cell, it will make all kinds of things, sort of willy-nilly," says [**Doug**] **Melton** [of Harvard].”

4. JDRF claims we need to federal funding new embryonic stem cell research because the existing lines are not genetically diverse. They claim we should only fund research on the 400,000 existing frozen embryos created for IVF. They don't acknowledge that those embryos will only generate 275 new EScell lines, according to RAND. And those won't have the required genetic diversity, since minorities are poorly represented among IVF clients. JDRF wants to open the door to fund the creation

of more embryos for destruction.

5. JDRF has denied funding to Harvard researcher Denise Faustman's work three times, though she has completely reversed diabetes in mice with adult stem cells. She has FDA approval to begin human clinical trials. The Ioccoca Foundation is raising money for her work.

6. JDRF claims that adult stem cells are limited in their plasticity. There are a number of studies showing proof of concept that adult stem cells are plastic. Here are three:

In July 2004, research conducted in Germany, led by Dr. Peter Wernet found a type of umbilical cord blood stem cell, they call USSC's (unrestricted somatic stem cells), that they showed can turn into several different cell types, including brain, bone, cartilage, liver, heart, and blood cells. This study was published in the Journal of Experimental Medicine. It showed that the cells can turn into all three germ layers, showing they are pluripotent. Wernet, Journal of Experimental Medicine.

Catherine Verfaillie's MAPCs: In 2002, University of Minnesota researchers published a study showing that a certain type of bone marrow stem cell (called a multipotent adult progenitor cells (MAPCs) could be turned into the three primary germ layers (endoderm, ectoderm and mesoderm). Verfaillie's work has turned MAPCs into skin, brain, lungs, heart, retina, muscle, intestines, kidney and spleen. *Nature* advance online publication, 23 June 2002 (doi: 10.1038/nature00870)

In January 2003, researchers reported that bone marrow stem cells differentiated into muscle, skin, liver, lung and neurons in rats, and into heart skin and intestine in humans. A follow-up study found bone marrow stem cells in females that received transplants from male donors. Researchers found the Y chromosome in the brain, showing that bone marrow stem cells generated neurons. Eva Mezey et al. Proceedings of National Academies of Science Published January 21, 2003.

7. JDRF downplays the ability of adult stem cells to treat diabetes. Here are a few studies showing treatment in mouse models, in addition to the work of Dr. Faustman, described above:

In 2002, it was reported that Univ. of Florida researchers turned liver stem cells into pancreatic cells, that when implanted into mice, the transformed cells reversed their hyperglycemia in 10 days. Yang L. et al., "In vitro trans-differentiation of adult hepatic stem cells into pancreatic endocrine hormone producing cells," *Proceedings of the National Academy of Sciences USA*, Online Early Edition; 10.1073/pnas.122210699; June 4, 2002.

In May of 2004, Univ. FL researchers restored normal blood sugar levels in diabetic mice for three months by getting bone marrow stem cells to transdifferentiate into islet-like cells that produced normal insulin levels. Oh SH, Muzzonigro TM, Bae SH, LaPlante JM, Hatch HM, Petersen BE. "Adult bone marrow-derived cells trans-differentiating into insulin-producing cells for the treatment of type I diabetes." *Lab Invest*. 2004 May;84(5):607-17.